

WHAT IS CLAIMED IS:

1. A method for treating wastewater in the absence of any additional carbon source comprising:
  - 5 (a) flowing the wastewater in the absence of any additional carbon source into a treatment basin in order to form the contents of the treatment basin and treat the wastewater;
  - (b) mixing the contents of the treatment basin;
  - 10 (c) introducing oxygen into the treatment basin for a first predetermined time period of from about 10 to about 120 minutes;
  - (d) stopping the introduction of oxygen into the treatment basin for a second predetermined time period of from about 7.5 to 120 minutes;
  - 15 (e) repeating said steps (c) and (d) a plurality of times; and
  - (f) flowing the treated wastewater out of the treatment basin into a clarifier, where treated wastewater is separated into clarified liquid effluent and sludge.
2. The method of claim 1 further comprising recycling the sludge into the treatment basin.
- 25 3. The method of claim 2 wherein the treated wastewater flowing from the treatment basin has a nitrate level of less than 5 ppm.
4. The method of claim 1 wherein the treated wastewater flowing from the treatment basin has a nitrate level of less than 5 ppm.
- 30 5. The method of claim 1 wherein the treated wastewater flowing from the treatment basin has a nitrate level of less than 1 ppm.

6. The method of claim 1 wherein said first predetermined time period is substantially the same as said second predetermined time period.
- 5 7. The method of claim 1 further comprising measuring the oxygen content in the basin and controlling the introduction of oxygen into the treatment basin such that a concentration of oxygen in the range of about 40 to about 60 percent is maintained for the first predetermined time period.
- 10 8. The method of claim 1 wherein the temperature ranges from about 5 °C to about 35 °C.
9. The method of claim 1 wherein the wastewater comprises about 50 ppm PO<sub>4</sub> as phosphoric acid.
- 15 10. The method of claim 1 wherein the pH is maintained in the range of about 7.0 to about 8.2.
- 20 11. The method of claim 1 wherein the first predetermined time period is different from the second predetermined time period.
12. The method of claim 1, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 10 to about 22.5 minutes.
- 25 13. The method of claim 12, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 7.5 to about 20 minutes.

30

14. The method of claim 1, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 7.5 to about 20 minutes.

5 15. The method of claim 1, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 10 to about 20 minutes.

10 16. The method of claim 15, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 10 to about 20 minutes.

15 17. The method of claim 1, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 10 to about 20 minutes.

18. The method of claim 1, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 14 to about 16 minutes.

20 19. The method of claim 18, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 14 to about 16 minutes.

25 20. The method of claim 1, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 14 to about 16 minutes.

21. The method of claim 1, wherein said first predetermined time period 30 of said step of introducing oxygen into the treatment basin and said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin are each about 15 minutes.

22. A process for reducing nitrogen compound levels in wastewater in the absence of additional carbon source, comprising the steps of:

- (a) flowing the wastewater in the absence of any additional carbon source into a treatment basin in order to form the contents of the treatment basin and treat the wastewater;
- 5 (b) mixing the contents of the treatment basin;
- (c) introducing oxygen into the treatment basin for a first predetermined time period of from about 10 to about 120 minutes;
- 10 (d) stopping the introduction of oxygen into the treatment basin for a second predetermined time period of from about 7.5 to 120 minutes;
- (e) repeating said steps (c) and (d) a plurality of times; and
- 15 (f) flowing the treated wastewater out of the treatment basin;  
wherein the treated wastewater flowing from the treatment basin  
20 has a nitrate level of less than 5 ppm.

23. The process of claim 22 wherein the treated wastewater flowing from the treatment basin has a nitrate level of less than 1 ppm.

25 24. The process of claim 23 wherein said first predetermined time period is substantially the same as said second predetermined time period.

30 25. The process of claim 22 wherein said first predetermined time period is substantially the same as said second predetermined time period.

26. The process of claim 22 further comprising measuring the oxygen content in the basin and controlling the introduction of oxygen into the treatment basin such that a concentration of oxygen in the range of about 40 to about 60 percent is maintained for the first predetermined time period.
- 5
27. The process of claim 22 wherein the temperature ranges from about 5 °C to about 35 °C.
- 10 28. The process of claim 22 wherein the wastewater comprises about 50 ppm PO<sub>4</sub> as phosphoric acid.
29. The process of claim 22 wherein the pH is maintained in the range of about 7.0 to about 8.2.
- 15
30. The process of claim 22 wherein the first predetermined time period is different from the second predetermined time period.
- 20 31. The process of claim 22, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 10 to about 22.5 minutes.
- 25
32. The process of claim 31, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 7.5 to about 20 minutes.
33. The process of claim 22, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 7.5 to about 20 minutes.
- 30

34. The process of claim 22, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 10 to about 20 minutes.

5 35. The process of claim 34, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 10 to about 20 minutes.

10 36. The process of claim 22, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 10 to about 20 minutes.

15 37. The process of claim 22, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin is from about 14 to about 16 minutes.

38. The process of claim 37, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 14 to about 16 minutes.

20 39. The process of claim 22, wherein said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin is from about 14 to about 16 minutes.

25 40. The process of claim 22, wherein said first predetermined time period of said step of introducing oxygen into the treatment basin and said second predetermined time period of said step of stopping the introduction of oxygen into the treatment basin are each about 15 minutes.